No. 692,076. Patented Jan. 28, 1902.

C. SEYMOUR.

SPOKE THROATING MACHINE.

(Application filed May 17, 1901.)

(No Model.) 6 Sheets—Sheet 1.

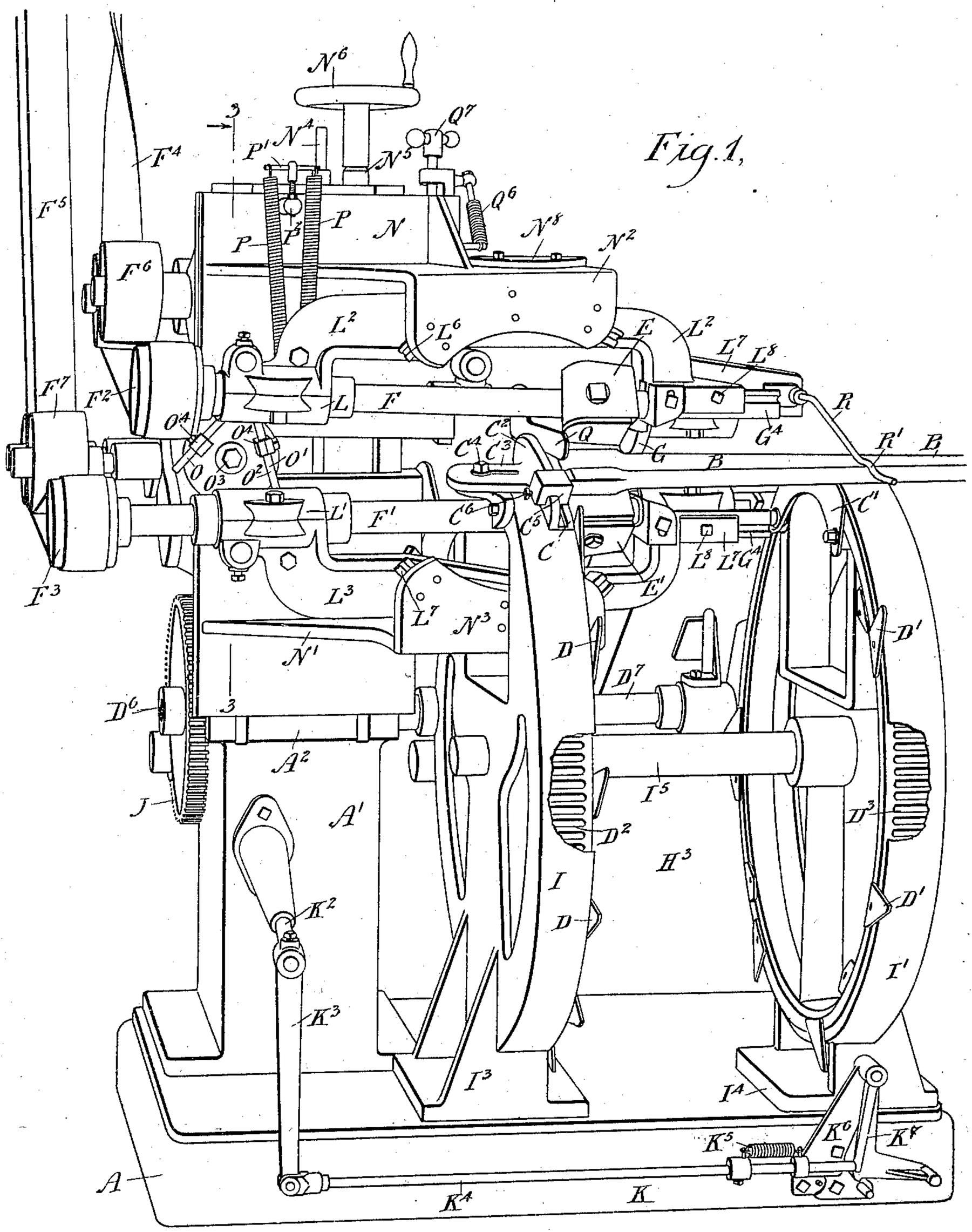

Fig. 1.

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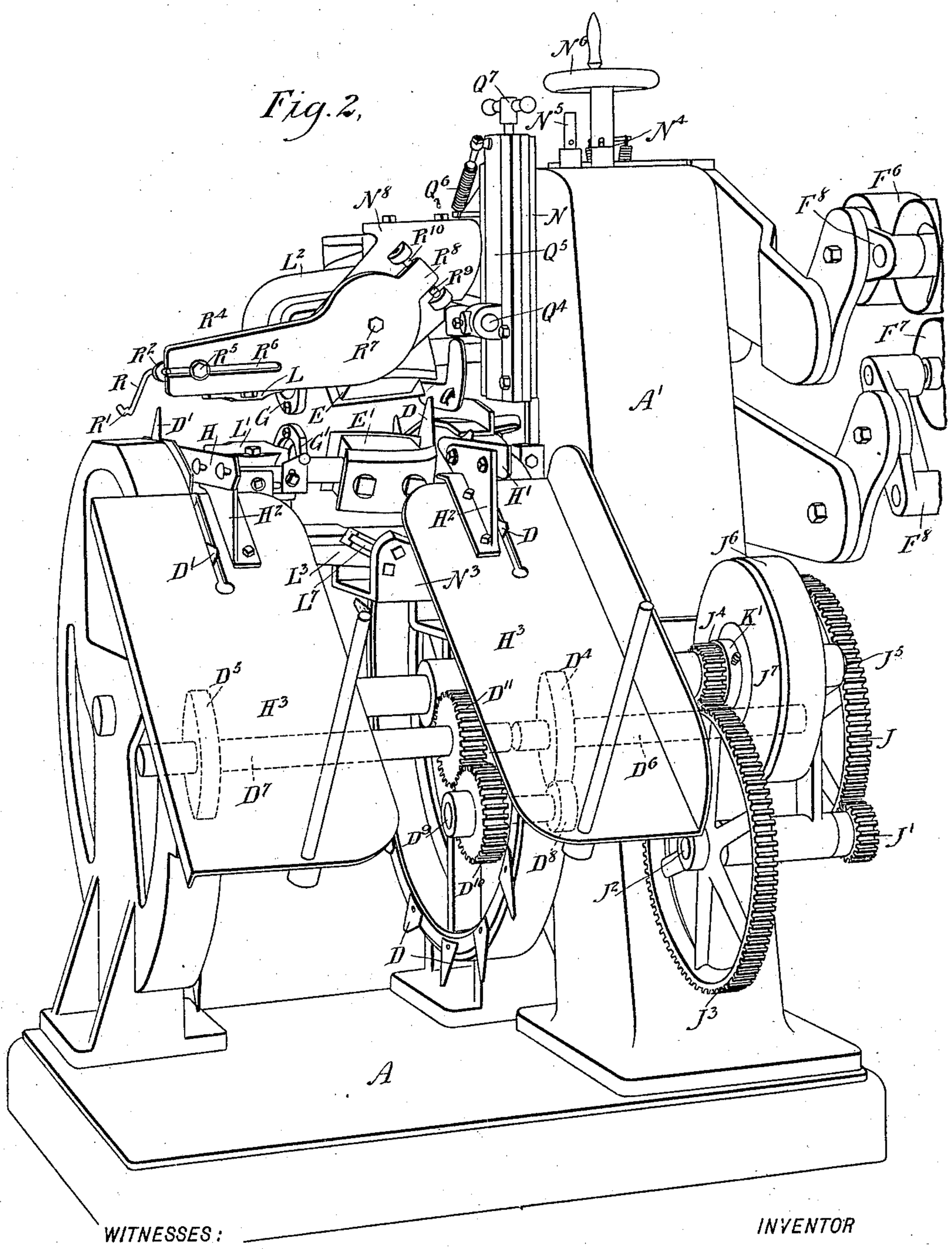
Fig. 2.



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(No Model.) 6 Sheets—Sheet 3.

Fig. 3,

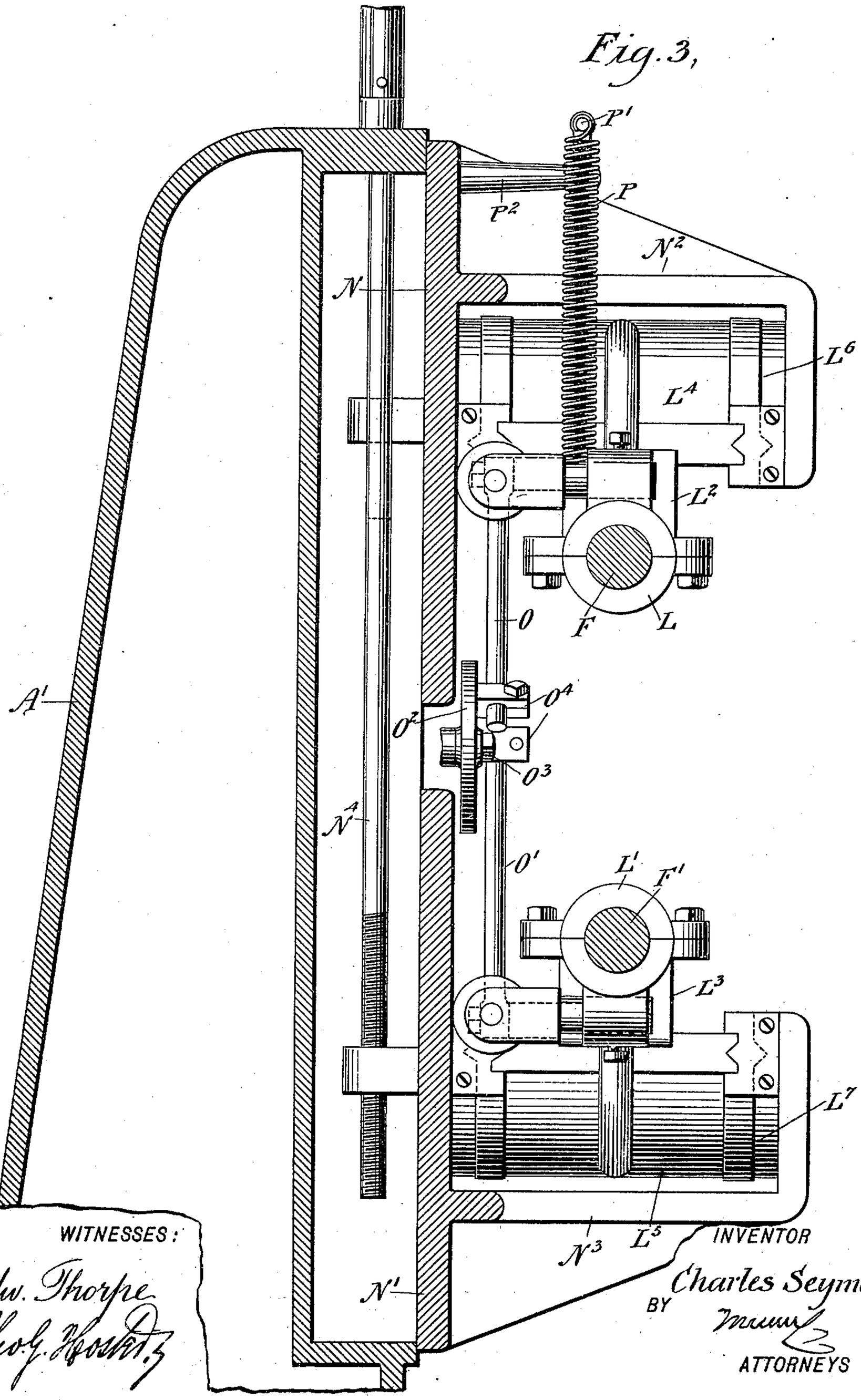

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Fig. 4,

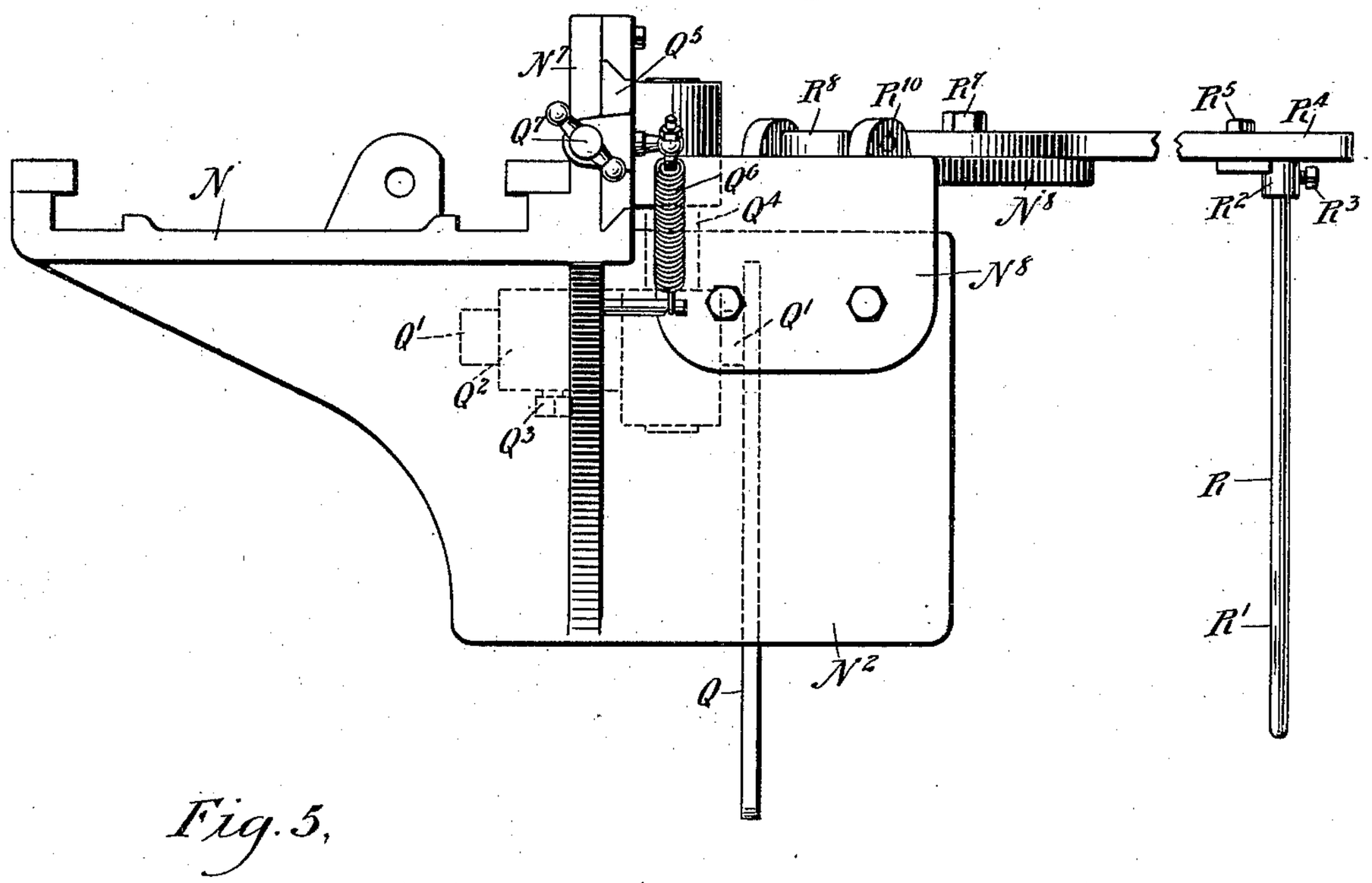
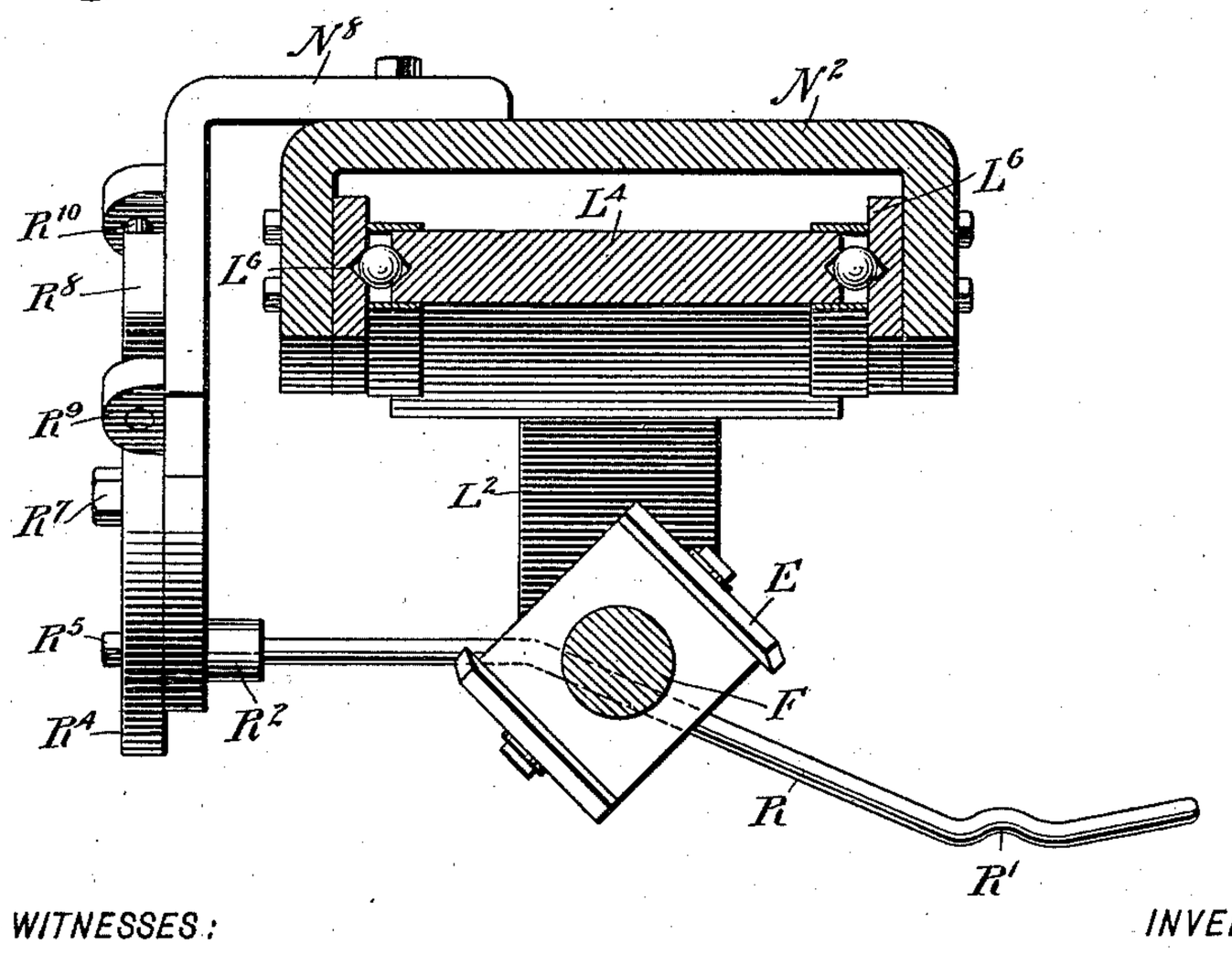


Fig. 5,



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(No Model.) 6 Sheets—Sheet 5.

Fig. 6,

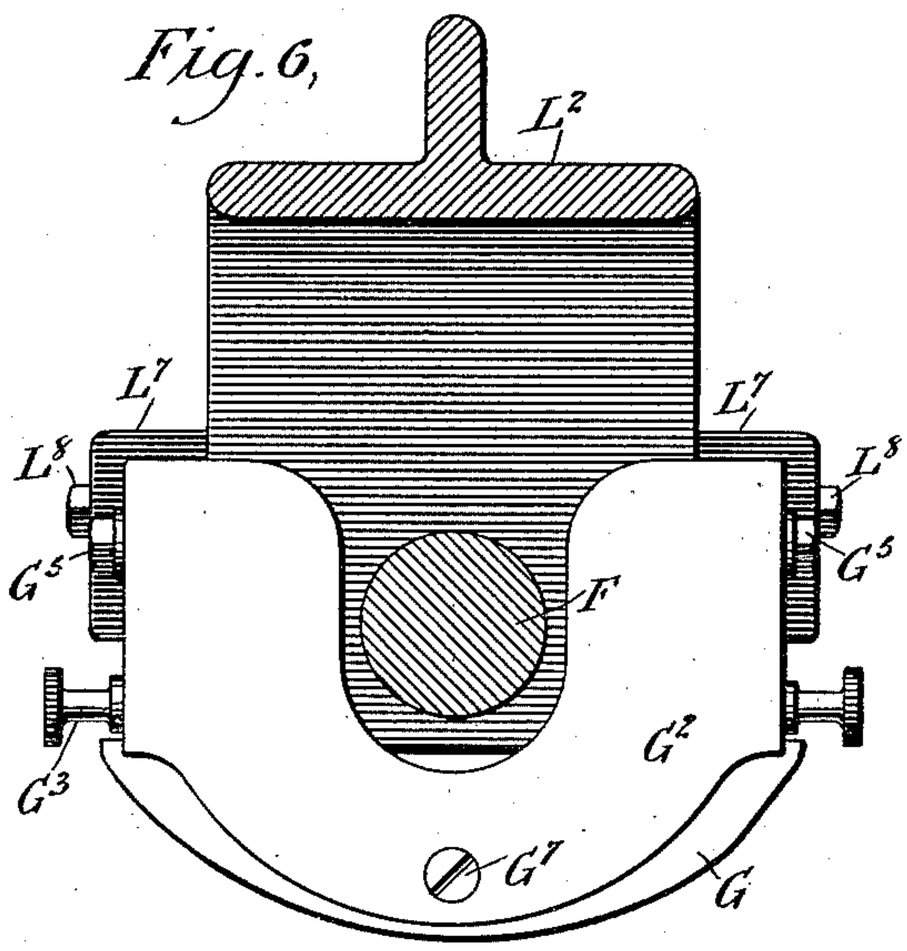


Fig. 7,

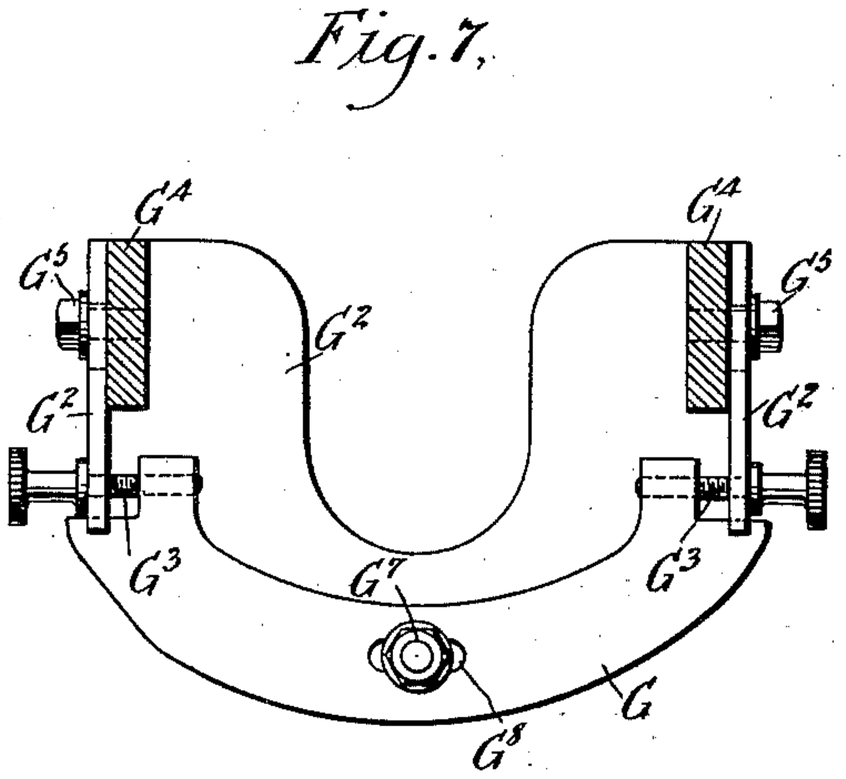
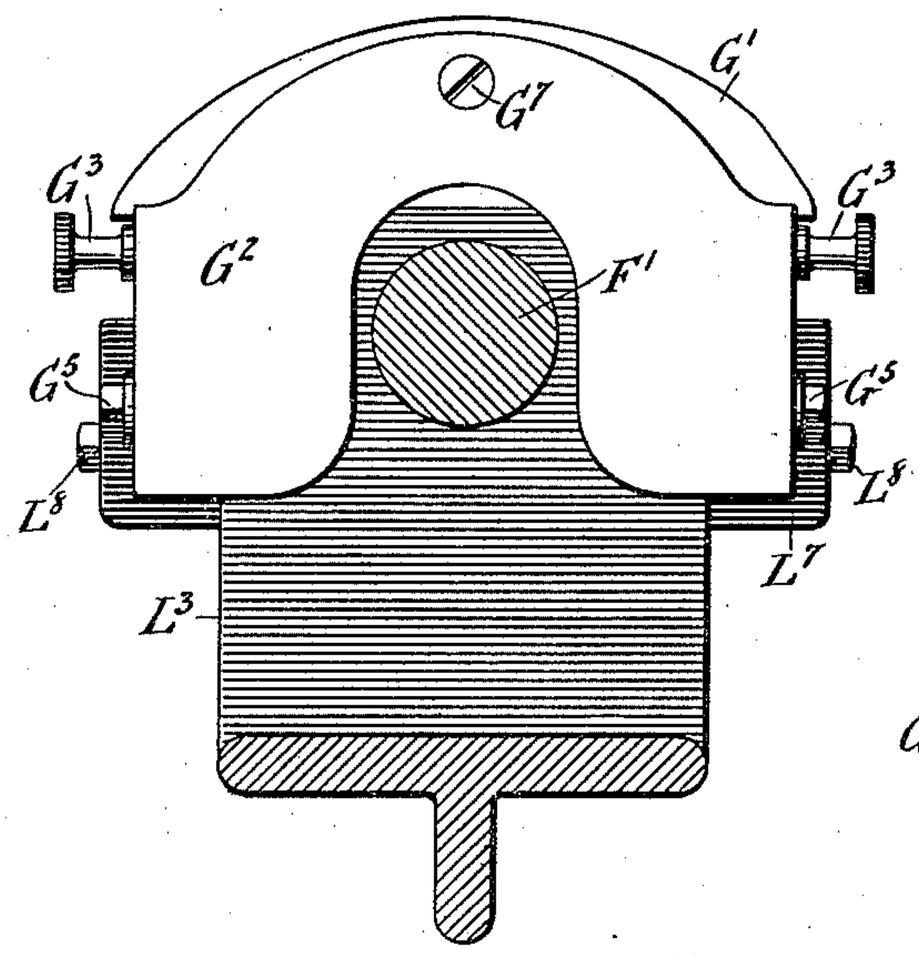


Fig. 8,



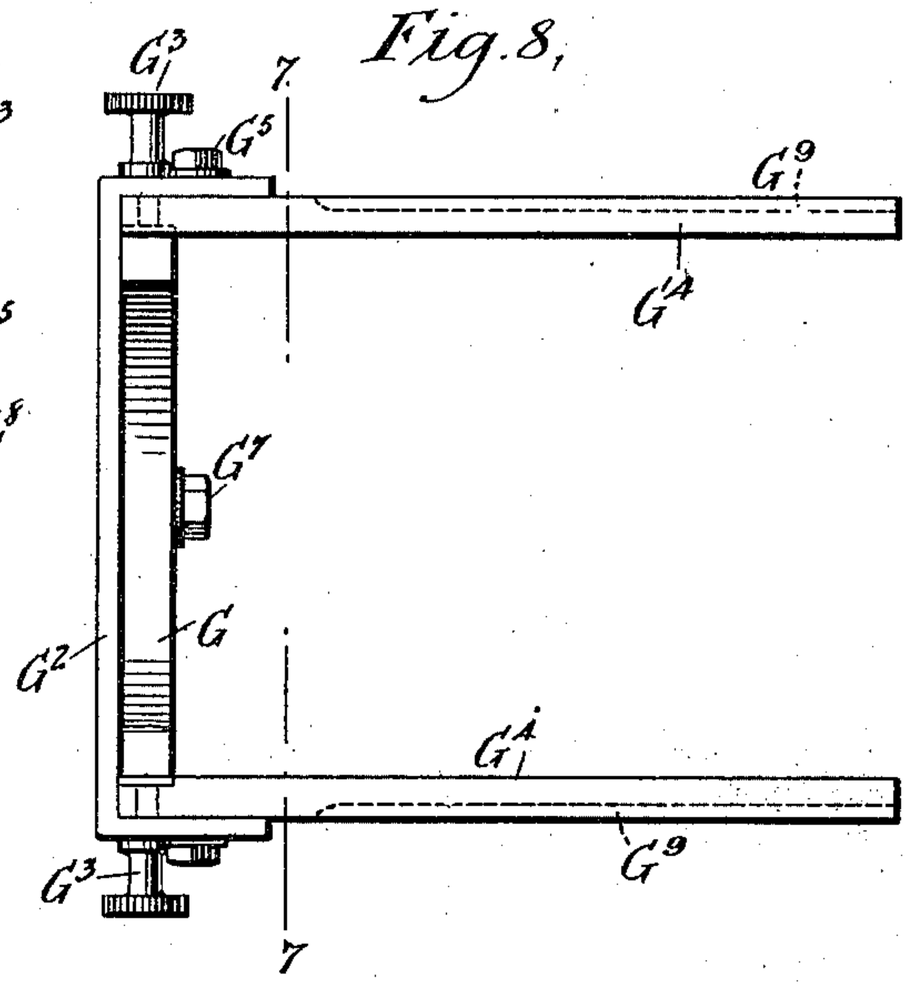
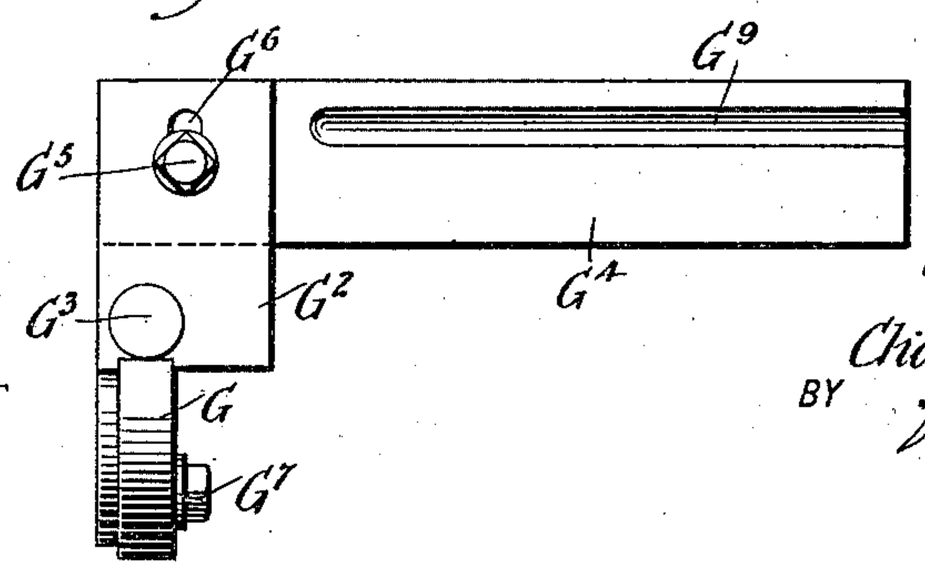


Fig. 9,



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(No Model.) 6 Sheets—Sheet 6.

Fig. 10.

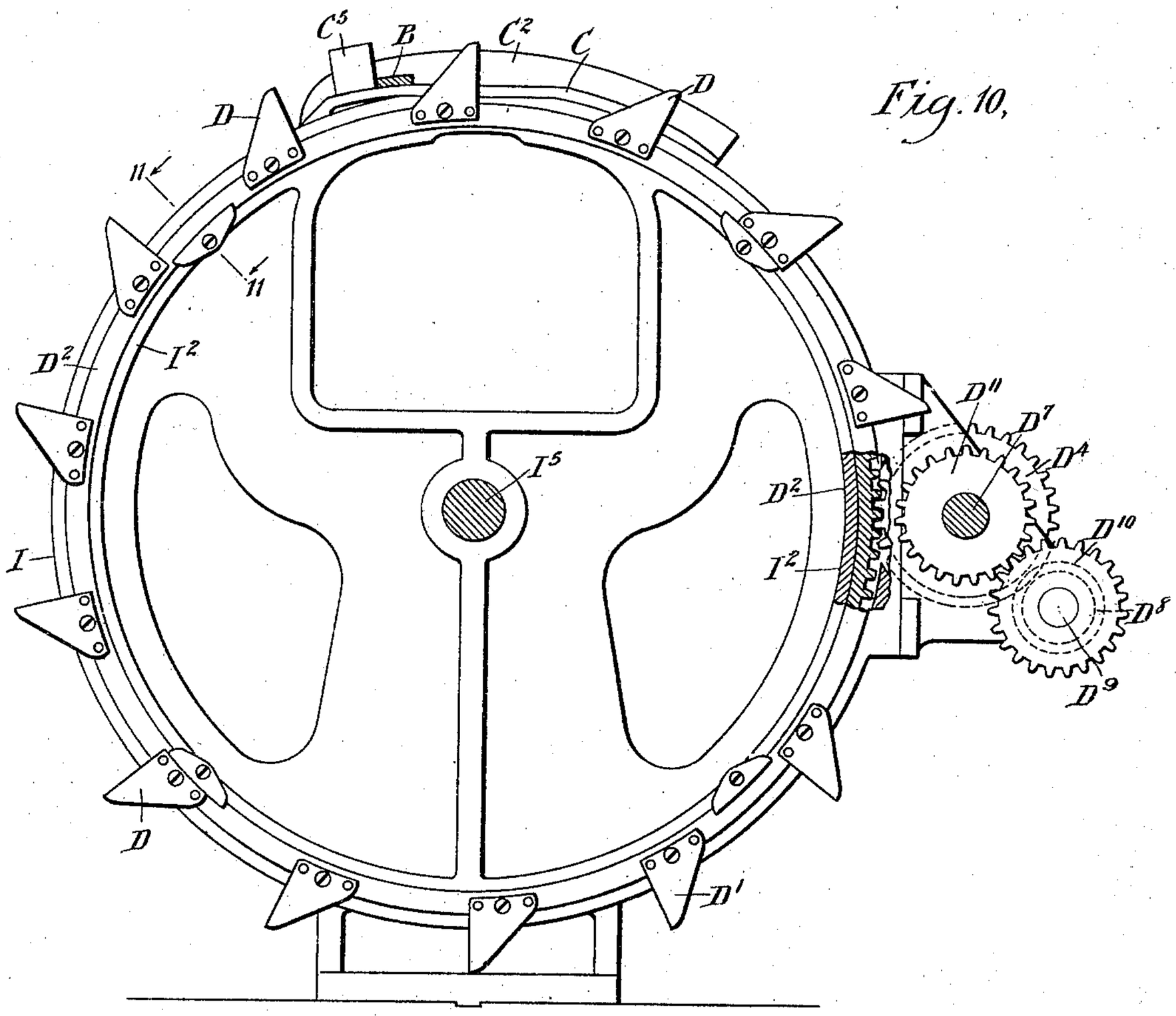


Fig. 11.

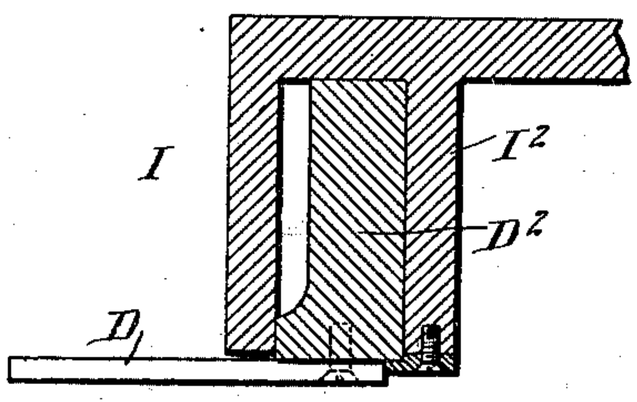


Fig. 12.

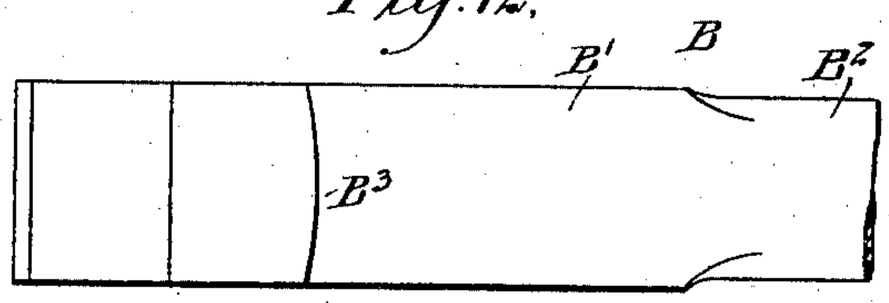
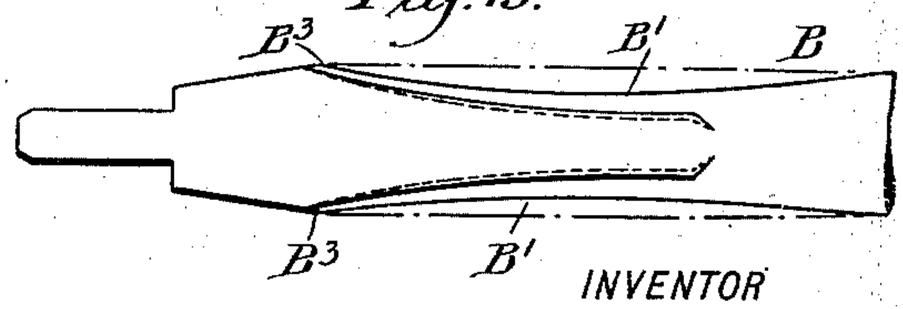


Fig. 13.



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Rud. J. Hoster Jr.

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UNITED STATES PATENT OFFICE.

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SPOKE-THROATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 692,076, dated January 28, 1902.

Application filed May 17, 1901. Serial No. 60,719. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SEYMOUR, a citizen of the United States, and a resident of Defiance, in the county of Defiance and State of Ohio, have invented a new and Improved Spoke-Throating Machine, of which the following is a full, clear, and exact description.

The invention relates to woodworking machinery; and its object is to provide a new and improved throating-machine designed for the use of spoke, wheel, and wagon manufacturers and arranged to rapidly, smoothly, and accurately form the throat at both sides of the spoke during the passage of the latter through the machine, the construction permitting handling of either large or small spokes of any pattern and in very large quantities in a comparatively short time.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a front perspective view of the improvement with parts broken out. Fig. 2 is a rear perspective view of the same. Fig. 3 is an enlarged transverse section of the same on the line 3 3 in Fig. 1, showing the cutter-head spindles, their bearings, and the adjustable saddles. Fig. 4 is a plan view of the upper saddle and the top guides for the spokes. Fig. 5 is an enlarged cross-section of the same with the cutter-head and its bearing in position. Fig. 6 is an enlarged transverse section of part of the improvement, showing the cutter-head spindles and the cam-shoes for imparting oscillating motion to the cutter-head bearings. Fig. 7 is a like view of the upper shoe and its support, the section being on the line 7 7 in Fig. 8. Fig. 8 is a plan view of the same. Fig. 9 is a side elevation of the same. Fig. 10 is an enlarged end elevation of the inner feed-reel, parts being broken out. Fig. 11 is an enlarged sectional plan view of the same on the line 11 11 in Fig. 10. Fig. 12 is a plan view of the finished spoke, and Fig. 13 is a side elevation of the same.

The throating-machine is mounted on a suitably-constructed frame formed, essentially, of a base A and a column A′, and the spokes B, to be formed on both sides with throats B′, are moved over the lower or bottom guides C C′ by the action of reel-arms D D′ to bring the unfinished throat portion of the spoke between a pair of cutter-heads E and E′, mounted to revolve and to oscillate in a vertical plane passing through the axes of the cutter-heads and their spindles F F′, the oscillation being brought about by cam-shoes G G′, engaged by the barrels B^2 of the spokes as the latter are moved transversely by the feed-reels. The arms D D′ of the feed-reels move at a different rate of speed, so that while the cutter-heads E E′ are in action on the throat a swinging motion in a horizontal plane is given to the spoke by the arm D′ moving faster than the arm D, and as the cutter-heads E E′ at the same time oscillate according to the shape of the barrel B^2, which acts as a pattern, it is evident that the throat is given the proper shape, as shown in Figs. 12 and 13—that is, the throat is rounded transversely by the oscillation of the cutter-heads and preferably made thicker on one side than on the other by the cam-shoes G G′ being correspondingly shaped. The segmental wheel-hub edge is also formed by the cutter-heads during the swinging of the spoke. Thus from the foregoing it is evident that the desired result is obtained by rotating and oscillating the cutter-heads and by feeding the spoke forward and at the same time giving it a swinging motion. The finished spokes are pushed rearward over the guides C C′ by the reel-arms D D′ and pass upon supports H H′, attached to brackets H^2, carried by a rack H^3, on which the spokes successively drop from the supports and from which the accumulated finished spokes are removed from time to time.

The reel-arms D D′ are secured to the inner faces of rim gear-wheels D^2 D^3, mounted to turn on annular bearings I^2, formed inside in the hoods or covers I I′, having bases I^3 I^4, bolted or otherwise fastened to the base A of the frame. The hoods I I′ are rigidly connected with each other at their centers by a bar I^5, and said hoods are cut out in their rims at the rear of

the machine for projecting gear-wheels D^4 D^5, respectively, as indicated in Figs. 2 and 10. The gear-wheel D^4 is secured on a shaft D^6, carrying at its outer end a gear-wheel J, in mesh with a pinion J', secured to an intermediate shaft J^2, journaled in suitable bearings at the rear of the column A', and on the said shaft J^2 is secured a gear-wheel J^3, in mesh with a pinion J^4, fastened on a shaft J^5, likewise journaled in suitable bearings at the rear of the column A'. (See Fig. 2.) On the shaft J^5 is mounted to rotate loosely a pulley J^6, connected by belt with other machinery for rotating said pulley, and the latter is adapted to be connected by a suitable friction-clutch J^7 with the shaft J^5 to rotate the latter whenever it is desired to run the machine. The friction-clutch J^7 is under the control of the operator standing at the front of the machine, and for this purpose said friction-clutch J^7 is connected with a shifting mechanism K, adapted to be worked by the foot of the operator at the front of the machine (see Fig. 1) to allow the operator to shift the friction-clutch J^7 and move the pulley J^6 in or out of gear with the shaft J^5. When the shaft J^5 is rotated, then the above-described gearing rotates the shaft D^6, which by the gear-wheel D^4 rotates the gear-wheel D^2 at a comparatively low rate of speed. The other gear-wheel D^3 is driven from the gear-wheel D^4 to rotate at a higher rate of speed than the gear-wheel D^2, and for this purpose the gear-wheel D^4 is also in mesh with a pinion D^8, secured on an intermediate shaft D^9, (see Figs. 2 and 10,) journaled in suitable bearings carried by the hood I, and on said shaft D^9 is secured a gear-wheel D^{10}, in mesh with a gear-wheel D^{11}, secured on the shaft D^7, carrying the gear-wheel D^5, previously mentioned, and in mesh with the gear-wheel D^3. By the gearing described the shaft D^9 is rotated from the gear-wheel D^4, and its rotary motion is transmitted to the shaft D^7, so that the gear-wheel D^5 rotates the gear-wheel D^3 at a higher rate of speed than the gear-wheel D^2. The arms D D' are fastened to the inner faces of the gear-wheels D^2 D^3, as previously mentioned, to project beyond the peripheral surfaces of the hoods I I', and thereby readily engage the spokes B, placed on the guides C C' by the operator, as hereinafter more fully described.

The cutter-head spindles F F' are journaled in bearings L L', held on hangers L^2 L^3, provided with segmental cross-heads L^4 L^5, mounted to slide in correspondingly-shaped segmental ball-bearings L^6 L^7, supported by the yokes N^2 N^3 of saddles N N', mounted to slide vertically, one above the other, on a suitable guideway formed on the front of the column A'. (See Figs. 1 and 3.) The saddles N N' are adjusted vertically by suitable screw-rods N^4 N^5, adapted to be turned by the use of a hand-wheel N^6, the screw-rods being mounted to turn loosely in suitable bearings on the column A' and engaging nuts on the saddles, so that when a screw-rod is turned the corresponding saddle is moved up or down, according to the direction in which the hand-wheel N^6 is turned. By the arrangement described the saddles N N' and their yokes N^2 N^3 can be adjusted so as to bring the cutter-head spindles F F' in the proper position for the cutter-heads E E' to press the throat portion of the spoke. By having the cross-heads L^4 L^5 mounted to slide in segmental bearings it is evident that the cutter-heads E E' receive an oscillating motion for giving the desired curvature to the throat of the spoke. The ends of the cutter-head spindles F F' are provided with pulleys F^2 F^3, connected by belts F^4 F^5 with other machinery for imparting a rotary motion to said spindles F F' and their cutter-heads E E' to rotate the cutter-heads in unison and dress the throat of the spoke. The belts F^4 F^5 pass over suitable idlers F^6 F^7 to compensate for the oscillating movement of the cutter-head spindles F F', said idlers F^6 F^7 being mounted for the purpose on pivoted arms F^8, as is plainly indicated in Fig. 2.

The cam-shoes G G', which control the oscillation of the cutter-heads E E', are longitudinally, transversely, and vertically adjustable, (see Figs. 1, 6, 7, 8, and 9,) and for this purpose each of the shoes G G' is mounted to slide transversely on bearings arranged on U-shaped arms G^2, the shoe being engaged at its ends by screw-rods G^3, mounted to turn in said arm G^2 to move the shoe transversely. Each arm G^2 is held vertically adjustable on the side arms G^4, longitudinally adjustable on a guideway L^7, formed on the forward end of the corresponding hanger L^2 or L^3. Bolts G^5 engage the sides of the arm G^2 and extend through elongated slots G^6 in said sides to screw in the side arms G^4, and thereby fasten said arm G^2 in place on the side arms G^4 to permit vertical adjustment of said arm G^2 on releasing the bolts G^5. A bolt G^7 extends through an elongated slot G^8 in each of the shoes G or G' to securely fasten the shoe to the mindle portion of the U-shaped arm G^2 after the latter has been transversely adjusted by the screw-rods G^3. Bolts L^8, screwing in the guideways L^7, engage longitudinal grooves G^9 in the side arms G^4, so as to secure the side arms in position on the guideways L^7 and permit of longitudinally adjusting said side arms on the guideways L^7 upon loosening the bolts L^8. It is understood that the adjustment of the cam-shoes G G' is necessary to adapt the machine to various kinds of spokes—that is, to permit of properly throating spokes of various shapes and lengths.

In order to cause the cutter-heads E E' to oscillate in unison toward or from each other, an equalizing device is provided, (see Figs. 1 and 3,) consisting, essentially, of links O O', pivotally secured to pivots O^1 on a disk O^2, mounted to turn on a stud O^3, carried by the column A'. The pivots O^4 for the links are mounted to turn in the disk O^2, so that the

oscillating movement given to either one of the hangers L^2 L^3 is transmitted by the links and the disk to the other hanger, whereby the hangers, and consequently the cutter-heads, oscillate in unison.

In order to move the cam-shoes G G′ toward each other to hold the shoes in contact with the surface of the barrel B^2, springs P are provided, connected with the hanger L^2 and attached to a vertically-adjustable support P′ and a stud P^2, secured to the saddle N. It is evident that a pull exerted in an upward direction on the hanger L^2 is transmitted by the links O O′ and the disk O^2 to the other hanger, and consequently the shoes G G′ are moved toward each other by the action of springs P to hold the shoes in contact with the surface of the barrel B^2.

The guides C C′ have their middle portions disposed horizontally and the ends extending downwardly and outwardly in opposite directions, and the inner lower guide C is formed with a transverse stop-flange C^2 and with a solid extension C^3 (see Fig. 1) to engage a bolt C^4 for adjustably securing the guide C to the hood I. On the front end of the guide C is adjustably held a stop C^5 by a set-screw C^6, and against the rear face of this stop is placed the tenon side of a spoke, the end of the tenon abutting against the flange C^2. Above the lower inner guide C extends the inner top guide Q for engaging the top of the spoke at the tenon end to hold the spoke from turning over while acted on by the cutter-heads E E′. The inner upper guide Q is secured to a rod Q′, (see Figs. 1 and 4,) held longitudinally adjustable in a bearing Q^2 by a set-screw Q^3, and this bearing is held transversely adjustable on a rod Q^4 by a set-screw, the rod being carried by a slide Q^5, mounted to move vertically in a guideway N^7 on the saddle N. A spring Q^6 presses the slide Q^5 in a downward direction, and a set-screw Q^7, screwing in said slide Q^5, is adapted to limit the downward sliding motion of the slide Q^5 by abutting against the top of the guideway N^7. By the arrangement described the upper inner guide Q can be longitudinally, transversely, and vertically adjusted according to the shape of the tenon of the spoke under treatment, it being understood that the guide is free to yield in an upward direction against the tension of the spring Q^6 in case of any unevenness on the tenon end of the spoke.

The upper outer guide R is in the form of a spring-rod having its free end formed with a catch or hook R′ to hook upon the top of the barrel of the spoke at or near the outer end thereof at the time the spoke is placed in position on the guides C C′ by the operator. The upper outer guide R extends transversely over the hood I′ and serves to hold the outer end of the spoke in place until the arm D′ of the outer feed-reel comes up and engages the spoke and pushes it from under the hook R′ and along the guide C′ to impart a swinging motion to the spoke, as previously explained.

The upper guide R is held transversely adjustable in a socket R^2 by a set-screw R^3, (see Fig. 4,) and the socket R^2 is held longitudinally adjustable by a set-screw R^5 in a slot R^6 in a lever R^4, fulcrumed at R^7 on a bracket N^8, secured to the yoke N^2, as is plainly indicated in Figs. 2, 4, and 5. The lever R^4 has an extension R^8, engaged at opposite sides by screws R^9 R^{10}, so as to permit of adjusting the position of the lever R^4 to bring the upper outer guide R in proper position relatively to the thickness of the barrel of the spoke under treatment in the machine.

The shifting device K for throwing the clutch J^7 in or out of gear with the driven pulley J^6 consists of a shifting-fork K′, (see Fig. 2,) secured on a rock-shart K^2, journaled in the column A′ and extending to the front thereof, as is illustrated in Fig. 1. On the front end of the rock-shaft K^2 is secured an arm K^3, pivotally connected with a rod K^4, pressed on by a spring K^5 for normally holding the clutch J^7 out of gear with the pulley J^6. The rod K^4 is mounted in a bearing or bracket K^6, secured to the base A, and the free end of the rod is adapted to be engaged by a treadle K^7, fulcrumed on the bracket K^6 and adapted to be pressed by the foot of the attendant to throw the clutch J^7 in gear with the pulley J^6, to rotate the shaft K^2, and consequently actuate the spoke-feeding device.

The operation is as follows: When the machine is in operation, the cutter-heads are continuously rotated, and whenever it is desired to actuate the spoke-feeding device, consisting, essentially, of the feed-reels driven at a higher rate of speed, as previously described, then the attendant standing in front of machine presses the treadle K^7, which throws the clutch J^7 in gear with the pulley J^6 and actuates the spoke-feeding device. The operator now places a spoke with the tenon end upon the lower inner guide C, directly in front of the stop C^5 and places the barrel of the spoke on the lower outer guide C′ and then pushes the barrel under the catch R′ of the upper outer guide R, to temporarily hold this end of the spoke. Now as the feed-reels are rotating one of the arms D engages the tenon end of the spoke and pushes the same along under the upper inner guide Q, and as the barrel end of the spoke is held under the guide R′ it is evident that the spoke assumes an angular position relatively to the vertical plane extending through the axis of the spoke-feeding device and the cutter-heads. The tenon end now passes upon the horizontal portion of the guides C and Q and between the cutter-heads E E′, so that the cutter-heads begin to remove the surplus material at the throat of the spoke. At this time one of the arms D′ engages the barrel end of the spoke and moves the same at a higher rate of speed than that at which the tenon end is moving, so that a swinging movement is given to the spoke on the horizontal portions of the guides C C′

to cause the cutter-heads to cut in a circular path on the throat of the spoke. At the time the cutter-heads begin their operation on the throat of the spoke the barrel of the spoke passes between the cam-shoes G G′, so that the cam-shoes are moved apart, and in doing so impart an oscillating motion to the cutter-head bearings and the cutter-heads to cause the cutter-heads to round the throat in a transverse direction at both the top and the bottom. It is understood that when the barrel of the spoke passes the center of the cam-shoes G G′ then the latter begin to move toward each other by the action of the springs P and the equalizing device connecting the cutter-head bearings with each other. Now by giving different shapes to the cam-shoes G G′ it is evident that different curvatures can be given to the throat and one side of the throat can be made thinner than the other side. The finished spoke is finally carried by the arms D D′ past the cutter-heads to pass upon the supports H H′, and as the spokes accumulate on the supports the first one is finally pushed off the rear ends of the supports and drops upon the rack H^3, from which the accumulated spokes are removed from time to time.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A spoke-throating machine having a pair of revoluble and oscillating cutter-heads, and a rotary spoke-feeding device for feeding a spoke to the cutter-heads and imparting at the same time a horizontally-swinging motion to the spoke, as set forth.

2. A spoke-throating machine having a pair of revoluble cutter-heads mounted to oscillate in a vertical plane extending through the axes of the cutter-heads, and a rotary spoke-feeding device for bringing the throat portion of a spoke to and between the cutter-heads, said feeding device having means for moving the spokes in a horizontal plane and for turning the spokes in said plane while the cutter-heads act on the throat portion to form the throat, as set forth.

3. A spoke-throating machine having a pair of revoluble cutter-heads mounted to oscillate in a vertical plane extending through the axes of the cutter-heads, a rotary spoke-feeding device for bringing the throat portion of a spoke to and between the cutter-heads, said feeding device having means for moving the spokes in a horizontal plane and for turning the spokes in said plane while the cutter-heads act on the throat portion and form the throat, and means for controlling the oscillating movement of the cutter-heads by the barrel of the spoke under treatment at the time, as set forth.

4. A spoke-throating machine having a pair of revoluble and oscillating cutter-heads, and a two-part rotary feeding device for feeding the spokes to the cutter-heads, one part of the feeding device moving at a greater rate of speed than the other, so as to impart a horizontally-swinging motion to the spoke, as set forth.

5. A spoke-throating machine having a pair of cutter-heads mounted to turn and to oscillate simultaneously toward or from each other and in a plane extending through the axes of the cutter-heads, a two-part rotary feed device for feeding the spokes, one part of the feeding device moving faster than the other and cam-shoes carried by said cutter-heads and adapted to be engaged by the barrel of a spoke as the latter is fed forward, the front and rear of the cam-shoes being differently shaped to give different thicknesses to the sides of the throat, as set forth.

6. A spoke-throating machine having a pair of revoluble cutter-heads mounted to oscillate, a rotary feed device for feeding a spoke between the cutter-heads and at the same time imparting a horizontally-swinging motion to the spoke, and cam-shoes carried by the cutter-heads and adapted to be engaged by the barrel of the spoke as the latter is fed forward to oscillate the cutter-heads as set forth.

7. A spoke-throating machine having fixed guides, a spring-rod for temporarily holding one end of a spoke, revoluble cutter-heads mounted to oscillate, a rotary feed device for feeding a spoke between the cutters and at the same time imparting a swinging motion to the spoke, and cam-shoes carried by the cutter-heads and adapted to be engaged by the barrel of the spoke as the latter is fed forward, as set forth.

8. A spoke-throating machine, having fixed lower guides, upper yielding guides for engaging the spoke, revoluble cutter-heads mounted to oscillate, rotary feed-arms for feeding the spoke between the cutter-heads and at the same time imparting a horizontally-swinging motion to the spoke, and cam-shoes carried by the cutter-heads and adapted to be engaged by the barrel of the spoke as the latter is fed forward to oscillate the cutter-heads, as set forth.

9. A spoke-throating machine having a spoke-feeding device, comprising fixed guides, and reels having arms for engaging the spoke at or near the ends and for pushing the spoke over said guides, the reel engaging the outer end of the spoke being arranged to travel at a higher rate of speed than the other reel and to impart a swinging motion to the spoke, as set forth.

10. A spoke-throating machine having a spoke-feeding device, comprising fixed guides, an inner reel and an outer reel, each of the reels having arms for engaging a spoke and pushing the same over the guides, and a gearing for rotating the outer reel at a higher rate of speed than the inner reel, to cause the arms of the outer reel to impart a swinging motion to the spoke while passing over said guides, as set forth.

11. A spoke-throating machine having a spoke-feeding device, comprising fixed guides,

an inner reel, an outer reel, each of the reels having a gear-wheel and arms extending from the gear-wheel, and separate gearings for said gear-wheels, to rotate the outer reel at a higher rate of speed than the inner reel, as set forth.

12. A spoke-throating machine having a spoke-feeding device, comprising fixed guides, an inner reel, an outer reel, each of the reels having a gear-wheel and arms extending from the gear-wheel, separate gearings for said gear-wheels, to rotate the outer reel at a higher rate of speed than the inner reel, and hoods extending over said gear-wheels and having bearings for the same, as set forth.

13. A spoke-throating machine having a spoke-feeding device, comprising fixed guides, an inner reel, an outer reel, each of the reels having a gear-wheel and arms extending from the gear-wheel, separate gearings for said gear-wheels, to rotate the outer reel at a higher rate of speed than the inner reel, and hoods extending over said gear-wheels and having bearings for the same, said hoods adjustably supporting said guides, as set forth.

14. A spoke-throating machine having a pair of cutter-heads, revoluble spindles on which the cutter-heads are secured, hangers for the spindles to turn in, segmental guideways in which the said hangers are mounted to slide, to oscillate the cutter-heads in unison, and an equalizing device for connecting said hangers with each other, the equalizing device consisting of a disk mounted to turn and links pivotally connecting the hangers with said disk, to cause the hangers to oscillate simultaneously toward and from each other, as set forth.

15. A spoke-throating machine having a pair of cutter-heads, revoluble spindles on which the cutter-heads are secured, hangers for the spindles to turn in, segmental guideways in which the said hangers are mounted to slide, to oscillate the cutter-heads in unison, an equalizing connection between the inner ends of the hangers, cam-shoes on the outer ends of the hangers and adapted to be engaged by the barrel of the spoke, and a spring connected with the inner end of one of the hangers, as set forth.

16. A spoke-throating machine having a pair of cutter-heads mounted to turn and to oscillate, fixed lower inner and outer guides having their middle portions disposed horizontally at the cutter-heads and the ends extending downwardly and outwardly in opposite directions, and a fast-rotating reel, and a slow-rotating reel, the reels having arms for moving the spokes over said guides, as set forth.

17. A spoke-throating machine having a pair of cutter-heads mounted to turn and to oscillate, fixed lower inner and outer guides having their middle portions disposed horizontally at the cutter-heads and the ends extending downwardly and outwardly in opposite directions, a fast-rotating reel, a slow-rotating reel, the reels having arms for moving the spokes over said guides, an upper inner guide, and means for adjusting the same vertically toward or from the lower inner guide, as set forth.

18. A spoke-throating machine having a pair of cutter-heads mounted to turn and to oscillate, fixed lower inner and outer guides having their middle portions disposed horizontally at the cutter-heads and the ends extending downwardly and outwardly in opposite directions, a fast-rotating reel, a slow-rotating reel, the reels having arms for moving the spokes over said guides, an upper inner guide above said lower inner guide, a rod carrying the upper inner guide, and an adjustable bearing in which the rod is held adjustably, as set forth.

19. A spoke-throating machine having a pair of cutter-heads mounted to turn and to oscillate, fixed lower inner and outer guides having their middle portions disposed horizontally at the cutter-heads and the ends extending downwardly and outwardly in opposite directions, a fast-rotating reel, a slow-rotating reel, the reels having arms for moving the spokes over said guides, and a stop adjustably held on said lower inner guide, as set forth.

20. A spoke-throating machine having a pair of cutter-heads mounted to turn and to oscillate, fixed lower inner and outer guides having their middle portions disposed horizontally at the cutter-heads and the ends extending downwardly and outwardly in opposite directions, a fast-rotating reel, a slow-rotating reel, the reels having arms for moving the spokes over said guides, and means for adjusting said lower inner guide sidewise relatively to the cutter-heads, for different spokes, as set forth.

21. A spoke-throating machine having a pair of cutter-heads mounted to turn and to oscillate, fixed lower inner and outer guides having their middle portions disposed horizontally at the cutter-heads and the ends extending downwardly and outwardly in opposite directions, a fast-rotating reel, a slow-rotating reel, the reels having arms for moving the spokes over said guides, an adjustable upper inner guide, and an adjustable upper outer flexible guide, as set forth.

22. A spoke-throating machine having a pair of cutter-heads mounted to turn and to oscillate simultaneously toward or from each other and in a plane extending through the axes of the cutter-heads, cam-shoes adapted to be engaged by the barrel of the spoke, to control the oscillating motion of the cutter-heads, and an equalizing device for causing the cutter-heads to positively oscillate in unison toward and from each other, as set forth.

23. A spoke-throating machine having a cam-shoe, an arm on which the shoe is mounted to slide transversely, means for adjusting the shoe transversely, and side arms on which the shoe-carrying arm is held vertically adjustable, as set forth.

24. A throating-machine having a cutter-head, an oscillating hanger having bearings for the cutter-head spindle, side arms held longitudinally adjustable on said oscillating hanger, an arm vertically adjustable on said side arms, and a cap-shoe held transversely adjustable on said arm, as set forth.

25. A throating-machine having a lower outer guide, an upper outer guide over said lower guide, and consisting of a flexible rod with a catch at its free end, a socket in which the rod is adjustably secured, and means for supporting said socket, the means being adjustable to move the free end of the rod up or down relatively to the outer guide, as set forth.

26. A throating-machine having a lower outer guide, an upper guide over said lower guide, and consisting of a flexible rod with a catch at the free end, a socket in which the rod is adjustably secured, and means for supporting said socket, the means being adjustable to move the free end of the rod up or down relatively to the outer guide, said means consisting of a lever in which the socket is held adjustably, and set-screws engaging the lever for adjusting the same, as set forth.

27. In a spoke-throating machine, the combination with a saddle, and a segmental guideway carried by the saddle, of a hanger having a segmental cross-head intermediate of its ends, said cross-head being fitted to slide in the said guideway, a revoluble cutter-head having its spindle mounted in the hanger, and a spring connecting the cross-head with the saddle, as set forth.

28. In a spoke-throating machine, the combination with adjustable saddles, and a segmental guideway carried by each saddle, of hangers each having a segmental cross-head intermediate of its ends, said cross-head sliding in the guideways, revoluble cutter-heads having their spindles mounted in the said hangers, an equalizing device connecting the hangers, and a spring connecting one of the hangers with one of the saddles, as set forth.

29. In a spoke-throating machine, the combination with saddles, sliding hangers carried by the saddles, and cutter-heads mounted in the hangers, of an equalizing device consisting of links having one end connected to the hangers, a disk mounted to turn, and pivots mounted to turn in the disk and to which the other ends of the links are secured, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES SEYMOUR.

Witnesses:

GEO. W. DEATRICK,

JOS. BAUER.